

4.6 Annex 6 - Baseline Report

Municipality: Plovdiv
 Building code:
 Building: UHAT „Sv.Georgi“ EAD
 Forensic medicine
 Address: Bld.“Vasil Aprilov” 15A, Plovdiv
 Total floor area, m²: 2 927



Expected results	Value
Energy saved, MWh/year	496.91
Energy saved, €/year	18 393
CO ₂ emissions saved, tco ₂ /year	105.60
CAPEX, €	154 864
Simple payback period ¹ , year	8.42

¹ Simple payback including cost price of materials, labor, mechanization, profit and not including cost of finance.

4.6.1. Current status of the building

Infrastructure	Description
Commissioned	1947 year
Building structure	Solid reinforced concrete structure with one semi-underground floor. Two corpuses – one with three overground and one attic floors, other with two floors. In the basement are located premises for a substation, storage rooms, laboratories, bathrooms. On the first floor is situated the clinic of Pathology; on the second is the Pathophysiology; on the third is the Forensic Medicine; in the lofts are situated classrooms, lecture halls and bathrooms
Facade walls	Basement - reinforced concrete surrounding walls, inside plastered, outside with stone facing, without heat insulation. Overground floors - masonry with solid brick, both sides plastered, without heat insulation.
Roof structures	Wooden structure with a roof of a wooden edging, covered with roof tiles. Attics (72%), unusable space (28%)
Floor structures	Floor over heated semi-underground floor (~ 72%) Floor on the ground (~ 28%)
Joinery	Wooden joined joinery (~ 45%) Double glazed PVC joinery (~ 48%) Single pieces of metal joinery with single glazing; solid metal joinery; solid wooden joinery.
Heating	Individual substation for heating, connected to power station of water vapour. Bad condition of the pipe-line system - insulation partially torn, leakage. Two-pipe system line and forced circulation. Radiators of cast iron, not fully functioning. There is no heat armature for regulation.
Domestic hot water	The DHW system works with an 5 m ³ external boiler, heated up by power station of water vapour. Thermal isolation with torn places.
Electric appliances and lighting	Appliances, affecting and non-affecting the heating; Lighting with luminescent lamps and incandescent lamps.
Air conditioning and ventilation	Partially ventilated building. Few rooms conditioned by individual air-conditioners, split system.
Operational hours	Residents: 12 hours a day, 5 days a week, excluding holidays Heating: 12 hours a day, 7 days a week, including holidays

4.6.2. Current energy consumption

Energy	Heating			Electricity		DHW		Total		
	Year	Gcal/year	MWh/year	€/year	MWh/year	€/year	MWh/year	€/year	MWh/year	€/year
	2012	440.35	512.13	24 041	93.33	8 387	4.45	209	609.91	32 637
	2013	403.65	469.44	21 642	49.30	4 746	4.45	209	523.19	26 597
	2014 ¹	442.87	515.06	23 751	47.72	3 363	4.45	209	567.23	27 323
	Average	428.96	498.88	23 145	63.45	5 498	4.45	209	566.78	28 852

¹ Reference year

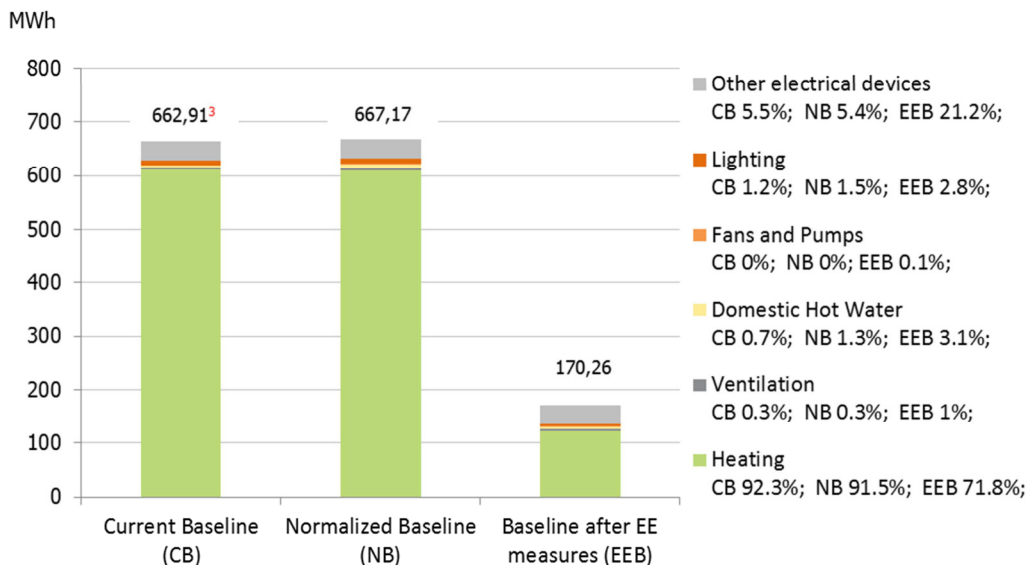
Actual prices of energy sources				
Nº	Energy source	Measure	Value	Consider since
1	Electricity	€/MWh	77.22	1/11/2015
2	Natural gas	€/MWh	36.29	1/1/2016
3	Central Heating Energy	€/MWh	35.20	1/10/2015

4.6.3. Analysis of the estimated energy savings

Energy saving measures		Energy saved ²			Capex	Pay-back
Nº	Description	MWh/year	€/year	t co ₂ /year	€	year
1	Insulation of external walls	124.47	4 517	30.08	42 576	9.43
2	Roof insulation	53.94	1 957	12.10	11 684	5.97
3	ESM on basement	9.59	348	9.58	3 522	10.12
4	Joinery replacement	34.35	1 247	7.71	17 598	14.12
5	Switching the heating from local to DHS supply					
	- heating system renovation	265.87	9 648	42.95	75 171	7.68
	- change of energy source	-	133			
6	Switching the DHW from local to DHS supply					
	- connecting subsystem for DHW supply	3.28	119	0.19	1 844	14.77
	- change of energy source	-	6			
7	Lighting measure	5.41	418	2.99	2 468	5.91
Total		496.91	18 393	105.60	154 864	8.42

² The amount of the energy savings is calculated according to the normalized value of the base consumption.

4.6.4. Energy consumption share



Parameter			Baseline	
Nº	Discription	Measure	Current	Normalized ³
1	Internal temperature	°C	21.2	21.2
2	DHW consumption	l/m ²	25.0	48.0
3	Lighting functioning	%	70.3	100.0

³ The difference between the numbers arising from the invoices and the software comes by technological deviation in the degree-days, used in modelling. According the methodology approved by the norm.

⁴ Values come from norm according to type and functioning of the building, number of persons inside, etc.

4.6.5. Energy saving measures - description

Energy saving measures	Activities	Measure	Price ¹ (€)	Quantity	Sum (€)
1. Insulation of external walls	Preliminary preparation of external walls	m ²	4.62	1 221	5 641
	Thermal insulation EPS 10 cm, flipping edges with safety profiles; plugging 8 pcs. / m2	m ²	21.37	1 221	26 093
	Plastering two layers of "scratched" mineral plaster	m ²	6.29	1 221	7 680
	Collection, transport and disposal of construction waste to landfill up to 20 kilometers.	m ²	2.59	1 221	3 162
	Total ESM 1:				42 576
2. Roof insulation	Mineral wool insulation 12 cm., covered with plaster	m ²	11.44	544	6 223
	Collection, transport and disposal of construction waste to landfill up to 20 kilometers.	m ³	1.47	544	800
	Preliminary preparation of roof	m ²	2.12	203	430
	Thermal insulation EPS 10 cm on roof, covered with plasterboard	m ²	10.97	203	2 227
	Flip, plastering and painting the adjacent areas	m ²	8.55	203	1 736
	Collection, transport and disposal of construction waste to landfill up to 20 kilometers.	m ³	1.32	203	268
	Total ESM 2:				11 684
3. ESM on basement	Preliminary preparation of external walls	m ²	4.62	101	467
	Thermal insulation EPS 10 cm, flipping edges with safety profiles; plugging 8 pcs. / m2	m ²	21.37	101	2 158
	Plastering two layers of "scratched" mineral plaster	m ²	6.29	101	635
	Collection, transport and disposal of construction waste to landfill up to 20 kilometers.	m ²	2.59	101	262
	Total ESM 3:				3 522
4. Joinery replacement	Mounting PVC windows with double panes (one multigrade and one float glass), exterior and interior window panels and anti-mosquito nets to the opening parts	m ²	88.61	168	14 886
	Sealing, patching and flipping edges ; plastering and painting from inside	m ²	10.6	168	1 781
	Dismantling of old joinery, collection, transport and disposal of construction waste to landfill up to 20 kilometers.	m ²	5.54	168	931
	Total ESM 4:				17 598

5. Switching the heating from local to DHS supply	Design of a new HVAC project for reconstruction - stage: technical level	m ²	0.75	2 927	2 195
	Dismantling of pipelines and radiators, iollection, transport and disposal of waste to landfill up to 20 kilometers	m ²	0.90	2 927	2 634
	Supply and installation of fan coils (Q heat / cool = 4,2 / 1,5kW) equipped with three-way valve for two-pipeline system	m ²	3.80	2 927	11 123
	Supply and mounting of a new pipeline system thermo-isolated for the heating system	m ²	16.70	2 927	48 881
	Supply and installation of pipelines for the condensate and connect the fan coil units to the internal electro grid	m ²	1.00	2 927	2 927
	Supply and installation of water collector and distributor with fittings and thermo isolation	m ²	1.00	2 927	2 927
	Supply and mounting of plasterboard decorations, mineral wadding isolated	m ²	0.40	2 927	1 171
	Supply and installation of a an automated system for the HVAC monitoring	m ²	1.10	2 927	3 220
	Charge new accession to the central heating	psc	93.82	1	94
Total ESM 5:					75 171
6. Switching the DHW from local to DHS supply	Connecting the subsystem to the existing DHW pipelines, thermo isolation of pipelines	m	55.00	25	1 375
	Dismantling of the existing boiler and pipeline connections, transport and disposal of waste to landfill up to 20 kilometers	m	15.00	25	375
	Charge new accession to the DHS	psc	93.82	1	94
Total ESM 6:					1 844
7. Lighting measure	Dismantling of luminaire, removing transformers and chokes	psc	2.81	57	160
	Removing fluorescent cigars, supply and mounting of LED cigars	psc	10.74	191	2 051
	Installation of luminaire back	psc	2.30	57	131
	Dismantling of incandescent lamp, supply and installation of energy saving lamp	psc	3.58	18	64
	Collection, transport and disposal of lighting waste to landfill up to 20 kilometers.	m ³	30.68	2	61
Total ESM 7:					2 468
Total:					154 864

¹ Cost assumptions are based on analyze of normal practice of local contractors and usage of the guide prices in construction - the last published edition (01.2016). Usage of trade marks is not permitted by the regulator. All the materials has to be chosen by their basic characteristics. All costs are considered at average level - neither conservative, nor optimistic.

4.6.6. Information about investment and savings according measures applied

Energy efficient measures

Type of Measures	Investments (BGN)	Savings (kW/h)		Savings (BGN)	
		Electrical Energy	Heat energy	Electrical Energy	Heat energy
Insulation of external walls	83 272		124 467		8 834
Roof insulation	22 852		53 936		3 828
ESM on basement	6 888		9 592		681
Joinery replacement	34 419		34 345		2 438
Switching the heating from local to DHS supply	147 022		265 874		19 131
Switching the DHW from local to DHS supply	3 606		3 284		244
Lighting measure	4 828	5 409		817	
Total:	302 887	5 409	491 498	817	35 157
CO2 Savings		2.99	102.61		

Additional activities

Type of Measures	Investments (BGN)
Related to external walls ESM	8 327
Related to roof ESM	2 285
Related to basement ESM	689
Related to joinery replacement	3 442
Related to switching the heating from local to DHS supply	14 702
Related to switching the DHW from local to DHS supply	361
Related to Lighting ESM	483
Total:	30 289

Energy consumption

Items	Object
Type of object	hospital
Gross floor area (sq.m.)	2 927
Type of heat energy before the project	Natural gas
Type of heat energy after the project	Central Heating Energy
Class of the building before the project	E
Class of the building after the project	B

Energy Prices (BGN/kWh)	Before the project (historical)	After the project
Electrical energy	0.14	0.15
Heat Energy (type of fuel)	0.09	0.07
Example: Diesel		
Example: Gas		

Object 1	Pre-project Consumption		Normalized consumption		Consumption after the project	
	kWh	BGN	kWh	BGN	kWh	BGN
Total consumption	662 908	61 902	667 166	62 381	170 258	15 366
Electrical energy	44 404	6 120	46 403	6 395	40 994	6 191
Heat Energy	618 504	55 782	620 763	55 986	129 264	9 175